The scope of indefiniteness

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1 Overview

- Today: exceptionally scoping indefinites and an influential account proposed by Reinhart 1997.

- What I'll emphasize: empirical benchmarks, some important characteristics of a non-movement-based analysis of exceptional scope. This will inform our discussion of alternatives.

- General focus: the wages of in situ.

2 Data

- As we saw last week, indefinites have a pretty easy time projecting their quantificational force out of islands. Both (1) and (2) admit readings with the indefinite taking maximal scope.

  (1) If ⟨a famous relative of mine dies⟩, I'll inherit a fortune.

  (2) Everyone who ⟨believed a famous expert on indefinites would be at the conference⟩ was sorely disappointed.

- As a reminder, the behavior of "strong" quantifiers like *every NP* and modified numerals seems to differ. The following lack wide-scope readings on which the embedded quantifier distributes over (resp.) *if* and *everyone*.

  (3) If ⟨every famous relative of mine dies⟩, I'll inherit a fortune.

  (4) Everyone who ⟨believed at least one famous expert on indefinites would be at the conference⟩ was sorely disappointed.

- Sluicing (more or less) requires an indefinite in an antecedent clause to have maximal scope (Chung et al. 1995; Reinhart 1997). Sometimes this maximal scope requires subverting islands (the flipside is the ostensible island-independence of sluicing type "movement" in the sluiced clause).

  (5) ...But I can't remember who.

  Useful for forcing a reading. For (5) to be a good continuation to either (1) or (2), the indefinite must take (exceptional) wide scope.

- Related data cross-linguistically, even in languages that seem to lack scope shift, or reserve it as a marked option (e.g. Japanese, Chinese, Hungarian).

- Disjunction also seems to be able to scope out of islands (Rooth & Partee 1982; Schlenker 2006):

  (6) John believes that Bill said that ⟨Mary was drinking or playing video games⟩ (*but I can't remember which*). (Rooth & Partee 1982, ex. 18)

Intriguingly, disjunctions are similar to indefinites in other respects. E.g., license donkey anaphora (e.g. Rooth & Partee 1982; Stone 1992):[1]

  (7) If John lost a watch$_i$ or a compass$_i$, Mary found it$_i$. (Rooth & Partee 1982, ex. 25)

  (8) Whenever Max [uses the fax]$_i$ or Oscar [uses the Xerox]$_i$, I can't$_i$. (Fiengo & May 1994: 200)

3 Analyses

3.1 First stab: referential indefinites

- Implementation along lines of Fodor & Sag 1982, analyzing wide-scope indefinites as referring indexical expressions:

  $$[\![-\mathrm{DEF}_{ref}]\!]^c :\approx \lambda P. \text{ the } x \in P \text{ that } c\text{'s speaker has in mind}$$

  Posits an ambiguity in the semantics of the indefinite determiner.

- Unaccounted for: why exceptionally scoping indefinites class with garden-variety indefinites in sluicing, but not with proper names/indexicals.

- Also unexplained: the existence of intermediate exceptional scope readings, i.e. readings on which the indefinite does not seem to be construed referentially (e.g. Farkas 1981; Ruys 1992; Abusch 1994).

  (9) Every professor$_i$ will rejoice if ⟨a student of his$_i$ cheats on the exam⟩. (Ruys 1992: 101)

  (10) Most lings have looked at every analysis that ⟨solves some problem⟩. (Reinhart 1997, ex. 21a)

- Referential treatment fails to generate intermediate readings and in the case of (9) manages to derive an impossible widest-scope reading, as well (i.e. one entailing that there's an individual every professor hopes cheats)!

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[1] Disjunction seems less happy licensing cross-sentential anaphora, but I don't know why.

3.2 Choice functions

- Intuition: exceptional scope looks like more like binding (e.g. long-distance, selective) than scope-taking (local). Binding can be non-local, and can happen from non-maximal positions.

- But a naïve binding treatment won't work. If we leave descriptive content in situ and simply bind a variable, we run into trouble. Consider the following for *John didn't meet a linguist*:[2]

$$\exists x. \neg(\text{meet}(\text{j}, x) \wedge \text{ling}(x))$$

  The truth of this is witnessed by any non-linguist (or by anybody John didn't meet, regardless of whether they're a linguist). That won't do.

- Reinhart's proposed solution: the thing being long-distance bound in exceptional scope cases is *higher-order*, i.e. a *choice function*.

- What is (the linguistically relevant notion of) a choice function? A choice function simply takes a set P and returns a member of P:

$$\text{CH} := \{f : \forall P \in \text{Dom}(f). f(P) \in P\}$$

  Notice that this says CFs applied to the empty set do not yield a defined result. This is a tricky issue, but I'll gloss over it.

- The basic implementation has two parts. First, the indefinite determiner denotes a variable ranging over choice functions. Second, we posit a silent existential closure operator which can be adjoined to any propositional node and imbue it with a syncategorematic semantics along the lines of predicate abstraction:

$$[\![-\text{DEF}_i]\!]^g := g(i)$$

$$[\![\exists_i X]\!]^g := \exists f. f \in \text{CH} \wedge [\![X]\!]^{g[f/i]}$$

- Simple example (assuming the quantified object is interpretable in situ, for simplicity):

$$[\![\exists_2 [\text{John read every book written by a}_2 \text{ famous linguist}]]\!]$$
$$= \exists f. \forall x \in \text{book-by-}f(\text{fam-ling}). \text{read}(\text{j}, x)$$

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[2]Reinhart never actually says how to derive truth conditions like this (she references Heim 1982, but does not share many of Heim's assumptions about the nature of $[\![\cdot]\!]$). However, a related treatment has been worked out in Szabolcsi 2003 and yields essentially the above.

The thing to note: even without moving out the relative clause island, the indefinite acquires a kind of "scope" over *every*. This mirrors how alternative semantics worked, as we saw in the previous class.

- Because binding of a choice function can happen from a non-maximal position, intermediate exceptional scope readings are likewise predicted.

- Choice functions also proposed for exceptional scope *vis à vis* questions (as Reinhart 1997 emphasizes; see also Dayal 1996, 2002), but not (so far as I know) for focus.

4 Issues

4.1 Explanatory oomph

- One question we might ask: which DPs can in principle be interpreted via choice functions (i.e. as a matter of getting the right truth conditions)? Are the CF-able DPs restricted to the exceptional scope-takers?

- Alas, no. The range of quantified DPs which can be interpreted via choice functions is quite large. For example, why should *at least one* behave differently from *some*? It does not seem that the relevant distinction can be a matter of truth conditions.

- What we do know: the exceptional scope-takers seem to license non-maximal donkey anaphora, and to readily admit cumulative interpretations (compare: *at least one dog*, *more than three men*).

  (11) I own a dog. I feed it Alpo. I own another dog. I feed it Iams.

  (12) Three men can lift two pianos.

  Yet while this is good news (i.e. there is independent motivation for classing off the exceptional scope-takers), it seems we still need to stipulate a distinction between one class of DPs and another.

- Reinhart 1997 considers these issues in some detail and concludes that the answer is to be found in the syntax. See also Kamp & Reyle 1993; Szabolcsi 1997 for further related discussion.

- I *don't* mean, by the way, to suggest that this is a special difficulty for choice-functional accounts. It's a worry for any semantics that treats indefinites specially. One we will keep in mind.

4.2 The scope of the restrictor

- Reinhart notes that in questions like (13), where *who* marks the scope of *which millionaire*, the admissible answers don't specify individuals the subject wants or believes to be millionaires.

  (13) Who wants to marry which millionaire?
     (Reinhart 1997, ex. 97)

  (14) Bob believes that his sows were blighted by a witch.
     (after Geurts 2000, ex. 12)

  Geurts piles on, noting a related *under-generation* issue. We want to derive a reading for (14) entailing that there is a witch such that Bob believes her to be a sow-blighter (cf. Fodor 1970; Keshet 2008).

- In both such cases, leaving the descriptive content in situ, as the choice functional analysis does, gives the wrong result: the descriptive content is interpreted intensionally rather than extensionally.

- Relatedly, Schwarz 2001 points out that unrestricted wide-scope quantification over choice functions derives unattested meanings when an indefinite is bound into by a non-increasing quantifier:

  (15) No candidate$_i$ submitted a paper he$_i$ had written.
     (Schwarz 2001, ex. 24)
     $\rightsquigarrow \exists f. \neg\exists x. \mathsf{cand}(x) \wedge \mathsf{subd}(x, f(\mathsf{paper\text{-}by\text{-}}x))$

  The truth conditions are that no candidate submitted *every* paper he wrote. That won't do. *No candidate* seems to delimit, or **roof**, the scope of the indefinite it binds into.

- Geurts 2000 points out another problem for cases like (16). Unrestricted existential closure lets us derive the following:

  (16) Every girl$_i$ gave a flower to a boy she$_i$ fancied.
     (Geurts 2000, ex. 5)
     $\rightsquigarrow \exists f. \forall x \in \mathsf{girl}. \exists y \in \mathsf{flower}. \mathsf{gave}(x, y, f(\mathsf{boy\text{-}fancied\text{-}by\text{-}}x))$

  The issue arises in a situation where the girls all fancy the same boys. In such a situation, since f is a function, the same individual must always be returned by $f(\mathsf{boy\text{-}fancied\text{-}by\text{-}}x)$. But (16) actually seems to (mysteriously) *require* some degree of covariation of boys with girls.

- To my mind, this looks a lot like a roofing configuration. But it has not been, so far as I know analyzed as such (outside Charlow 2014).

- Something like roofing can even be observed in association with focus. For example, *John only read a book by TOLSTOY* seems to lack a reading on which the indefinite out-scopes *only*. However, using choice functions allows us to derive the following:

  $$\exists f. \{x_e : \mathsf{read}(\mathsf{j}, f(\mathsf{book\text{-}by\text{-}}x))\} = \{\mathsf{t}\}$$

  This problematically means that there's a way of choosing books on which Tolstoy's the only x such that John read *that* book by x! In other words, John read a book by Tolstoy, and he didn't read *every* non-Tolstoy book.

- ...And layered DPs: *John didn't read a book by a famous linguist.*

  $$\exists f. \neg\exists g. \mathsf{read}(\mathsf{j}, f(\mathsf{book\text{-}by\text{-}}g(\mathsf{fam\text{-}ling})))$$

  Truth conditions (roughly): every famous linguist has some book that John didn't read. This does not represent a possible reading.[3]

- Analogous issues for *John met a member of fewer than three committees.* Can derive a reading which guarantees a way of picking members such that fewer than three committees x are such that John met *that* member of x.

4.3 Under-generation for anaphora

- Characteristically, indefinites can antecede pronouns they don't c-command at LF. For example:

  (17) A linguist$_i$ got up and left the talk. She$_i$ was tired.

  (18) If somebody$_i$ knocked, he$_i$ must have left.

- To cope with this, we might imagine a dynamic version of a choice functional account (cf. e.g. von Heusinger 2004). This allows choice functions to be combined with a dynamic treatment of cross-sentential anaphora (and, in principle, donkey anaphora). Here is a simple example of a dynamified choice-functional semantics for *a linguist left*:

  $$\underset{\text{A LINGUIST LEFT}}{\underbrace{g \rightsquigarrow \{g + f + x : f \in \mathsf{CH} \wedge x = f(\mathsf{ling}) \wedge \mathsf{left}(x)\}}}$$

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[3]Interestingly, the other reading, the one which gives widest scope to the *embedded* DP *a famous linguist*, also seems absent. This is surprising on just about any view.

- But this analysis works less well for exceptional scope cases. In (19), the pronoun is naturally interpreted as ranging over relatives of mine (whose death gets me a house).

(19) If ⟨a relative of mine$_i$ dies⟩, I'll inherit a house. She$_i$'s rich.

- Now, dynamic semantics standardly has it that discourse referents generated inside a conditional are inaccessible outside it (cf. e.g. *if someone$_i$ knocked, she$_i$ left; she$_i$ ran*). So for cases like (19), the dynamic analysis should yield the following:

$$\{g + f : f \in \mathsf{CH} \wedge (\mathsf{dies}(f(\mathsf{rel})) \Rightarrow \$\$\$)\}$$

Only the choice function is accessible outside the conditional. Thus, the account needs to be supplemented with a mechanism of descriptive enrichment (e.g. ellipsis, perhaps à la Elbourne 2005) to derive reasonable truth conditions in such cases (e.g. Chierchia 2005; Brennan 2011).

- In sum, exceptional scope-taking *feeds* anaphora. Choice functions alone do not tell us why this should be so.

5 Intensional choice functions?

- At the very end of her paper, Reinhart refines the definition of what counts as a choice function.

$$\mathsf{ICH} := \{f_{(set)e} : \forall P \in \mathsf{Dom}(f).\, f(P) \in {}^{\vee}P\}$$

The idea is that a choice function combines with an *intensional* property, and forces it to be evaluated *extensionally*.

- In fact, this fix is proposed to deal with cases like (13) and (14). Intended to derive the following: wherever a choice function is existentially closed, that's the index relative to which the restrictor NP is construed.

- Winter 1997 argues this solves the problem posed by Geurts's (16): if the argument of the choice function is an intensional property, we can distinguish the property of being a boy x fancied from being one y fancied, even if x and y happen to fancy the same boys in the world of evaluation.

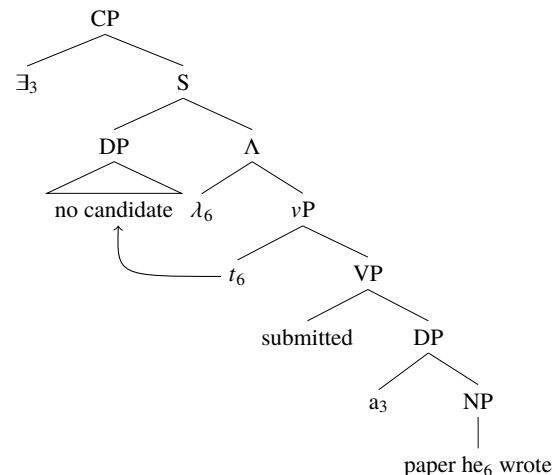$$f({}^{\wedge}\mathsf{boy\text{-}fancied\text{-}by\text{-}}x)$$

Figure 1: LF for *no candidate$_i$ submitted a paper he$_i$ wrote*

I don't think this is right. It seems that whatever explains (16) should explain *all* the data in Section 4.2.

- *However*, though this hasn't been noted (so far as I know), we can exploit intensional choice functions to explain (some, perhaps all) roofing as well. All we need in order to do so is to have a properly intensional treatment of assignment sensitivity binding (cf. e.g. Sternefeld 1998, 2001)!

- Core stuff (essentially, recasting Reinhart's insight in Ty2 and extending it to assignment sensitivity, as a type of intensionality):

$$[\![\exists_i X]\!] := \lambda g.\, \exists f \in \mathsf{CH}(g).\, [\![X]\!](g[f/i])$$
$$\mathsf{CH}(g) := \{f_{(aet)e} : \forall P.\, f(P) \in P(g)\}$$

- See LF in Figure 1. Relies on some ancillary definitions. Most importantly:

$$[\![\mathsf{paper\ he_6\ wrote}]\!] := \lambda g.\, \lambda y.\, \mathsf{paper}(y) \wedge \mathsf{wrote}(g(6), y)$$

- We find that:

$$[\![\mathsf{CP}]\!] = \lambda g.\, \exists f \in \mathsf{CH}(g).\, \neg\exists x.\, \mathsf{cand}(x) \wedge \mathsf{subd}(x, f([\![\mathsf{paper\ he_6\ wrote}]\!]))$$

- By assumption, $f \in \mathsf{CH}(g)$ only if f maps $[\![\mathsf{paper\ he_6\ wrote}]\!]$ to a member of $[\![\mathsf{paper\ he_6\ wrote}]\!](g)$. Since g is the "actual" assignment, rather than

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the "modal" assignment $g[x/6]$ introduced by the abstractor operator λ_6, the pronoun isn't bound.[4]

- Applying existential closure at vP gives the familiar narrow-scope reading.

- Missing, still: an explanation for a roofing-like phenomenon in the domain of association with focus, and crucially, an account of how exceptional scope feeds donkey anaphora.

- We could imagine separate solutions for those issues, but ideally one solution would cover all of them. For example, the correct analysis of focus might look more intensional than treatments following Rooth 1985. (Indeed, Kratzer 1991 has proposed something along those lines.)

6 Scope after all?

- All signs point to indefinites actually being evaluated at their scope position! In other words, indefinite scope looks awfully scope-y! Exceptional QR would handle all these cases swimmingly (though we would still be disturbed that indefinites could QR in ways other quantifiers could not).

- Though we can hack something together with an intensionalized version of what counts as a "choice function", this takes a degree of stipulative gerrymandering, and it's not clear if there's a way forward on all the data we'd like to cover.

- The issues are characteristic of in situ treatments, even those that make no reference to choice functions (e.g. Schwarzschild 2002; Kratzer & Shimoyama 2002; Brasoveanu & Farkas 2011).

- However, Ruys 1992 and Reinhart 1997 object that island-free QR gives the wrong results for plural indefinites. The following has an exceptional scope reading, but does not admit an exceptional *distributive* reading.

  (20) If three relatives of mine die, I'll inherit a house.

- One of our main tasks: assessing the extent to which an analysis of indefinites can imbue their ostensible "scope-taking" with all the hallmarks of scope-taking, while respecting islands and the ways in which it differs from bona fide scope-taking.

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[4]Among the interesting features of this analysis: it allows he_6 to be bound across an intervening co-indexed abstractor.

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